Effects of the Addition of Various Oxides on the Crystallization of Lithia-Silica Glass

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are represented approximately by the circular-arc rule. Both the limiting dielectric constants at low frequencies and the conductivities at higher frequencies deccreased on application of shearing stress. It is considered that these changes in the dielectric properties of emulsions under shear may be caused by the breaking up of particle agglomerates. The limiting dielectric constants at high frequencies were subjected to no shearing effect, and are expressed best by the Bruggeman equation over the whole range of concentration. The data are discussed in the light of the previous theory on the interfacial polarization.

(d, α) Reactions on O^{16}, N^{14} and C^{12} by 14.7 MeV Deutrons

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Angular distributions of α particles resulting from $O^{16}(d, \alpha_0)N^{14}$ (ground state), $N^{14}(d, \alpha_0)C^{12}$ (ground state), $N^{14}(d, \alpha_1)C^{12}$ (first exited state), $C^{12}(d, \alpha_0)B^{10}$ (ground state) and $C^{12}(d, \alpha_1)B^{10}$ (first exited state) reactions were studied. α partices from the $O^{16}(d, \alpha_0)N^{14}$, $C^{12}(d, \alpha_0)B^{10}$ and $C^{12}(d, \alpha_1)B^{10}$ reactions exhibited forward peaks and backward peaks simultaneously, while α particles from $N^{14}(d, \alpha_0)C^{12}$ reaction showed forward peaks and oscillatory behavior.

α particles leaving N^{14} and C^{12} nuclei in their $T=1$ state were also observed in the forward angle, and the isotopic spin conservation rule seemed to be violated.

The reaction mechanism is then discussed on the basis of the surface direct reaction, the compound nucleus formation and α prticle clustering in the target nucleus. It is concluded that α clustering may play an important role in the (d, α) reaction.

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Sumio SAKKA and Megumi TASHIRO

Yogyo Kyokaishi (*Journal of the Ceramic Association, Japan*), **69**, 67 (1961)

Generally, on the reheating of lithia-silica glass, it starts to crystallize at the temperatures near or below the softening point to convert into the polycrystalline material without deformation (M. A. Matveev, V. V. Velya, *Steklo i Keramika*, **16** [10] 14 (1959).

In the present study, various oxides were added as the third component to a lithia-silica glass of the composition, Li_2O 25, SiO_2 75 mol%, and their effects on the crystallization of the base glass on reheating were investigated.

It was found that there is a limit in the amount for each oxide, and the addition over the limit inhibits the crystallization of the glass giving rise to the

deformation or surface crazing of the sample during reheating. The limit of the amount of addition in mol% for each of the oxides varied with the own property of the oxides as follows:

(1) For each of the series of alkali- and alkaliearth-oxide, which acts as the glass network modifier in the glass stucture, the limit decreases with the increase of the size of cation, *i. e.*,

The vaue of limit: $NaO_{0.5}$> $KO_{0.5}$ $RbO_{0.5}$, MgO>CaO>SrO>BaO.

For the oxides with the cation of about the same size but of the different valency, the oxide with the cation of the higher valency has always the higher limit, *i. e.*,

The value of limit: CaO>$NaO_{0.5}$, SrO>$KO_{0.5}$, BaO>$RbO_{0.5}$.

(2) For the glass network formers ($BO_{1.5}$, $AlO_{1.5}$, $PO_{2.5}$, and $AsO_{2.5}$) and also for the intermediates (BeO, PbO, CdO, ZrO_2, CeO_2, $LaO_{1.5}$) the limit was generally low compared with that for the glass network modifiers, with the exception for the oxides of transition element (TiO_2, $MnO_{1.5}$, $VO_{2.5}$, $CrO_{1.5}$, $FeO_{1.5}$, CoO, NiO).

The structural explanations were made of the above results in terms of the polarizing power, and the ability of strengthening the glass network, of the cation in the oxides introduced.

Studies on the Devitrification of the Glasses of the System Li_2O-ZnO-Al_2O_3-SiO_2

Sumio SAKKA and Megumi TASHIRO

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Studies were carried out for the purpose of finding out the range of compositions in the system Li_2O-ZnO-Al_2O_3-SiO_2, in which the change by reheating to polycrystalline bodies occurs witout accompanying the defects as flaw and crease, and of measuring properties of the devitrified glasses.

The results obtained are as follows:

1) Changing the Li_2O content as 4, 6, 8, 12 and 16 against ZnO+Al_2O_3+SiO_2 =100 the range, in which the batches may be melted at 1300~1400°C to clear glasses and prododuce perfect polycrystalline specimens by reheating, was determined.

2) Occcasionally, above specimens supported by two knife edges deformed by their own weight during the reheating. When Li_2O content was as low 4, 6, 8 the amout of ZnO has proved to be most influential in the deformation, and it was confirmed that such trend was becomming smaller with the increasing amount of ZnO.

3) The differential thermal and X-ray analyses have disclosed that from the specimens of low Li_2O (4, 6, 8) the primary crystals were ZnO-compounds such as $2ZnO \cdot SiO_2$, while from those of high Li_2O the primary crystalline phase was composed of lithium compounds such as $Li_2O \cdot 2SiO_2$.

When the reheating was carried out at higher temperatures, *i. e.*, 50~100°C